Risk factors associated with mental health problems in expectant and new fathers: A critical literature review

by
Jenny Larkin

Bachelor of Arts, McGill University, 2008

Capstone Project Submitted in Partial Fulfillment of the
Requirements for the Degree of
Master of Public Health

in the
Master of Public Health Program,
Faculty of Health Sciences

SIMON FRASER UNIVERSITY

Fall 2017

Approval

Name:	Jenny Larkin
Degree:	Master of Public Health
Title:	Risk factors associated with mental health problems in expectant and new fathers: A critical literature review
Examining Committee:	Dr. Charlotte Waddell Senior Supervisor Professor, Faculty of Health Sciences
	Dr. Denise Zabkiewicz Second Reader Associate Professor, Faculty of Health Sciences
Date Defended/Approved:	September 18, 2017

Abstract

Background: Current research indicates that expectant and new fathers with mental health problems can be less attentive and nurturing toward their children and their partner. These behaviours can negatively affect child wellbeing and development, spousal relations, and family functioning. Yet relatively little is known about paternal mental health risks.

Methods: To identify risk factors associated with paternal mental health problems, prenatal and postnatal, a critical literature review was undertaken of observational studies published in English-language academic journals between 2012 and 2017. CINAHL, Education Source, MEDLINE, and PsycINFO were searched; 552 studies were initially identified and screened; 52 were assessed in detail; and 12 met inclusion criteria.

Findings: Methodologically, the quality of the 12 included studies varied and included both cross-sectional and longitudinal approaches, as well as a randomized controlled trial, in samples ranging in size and representativeness. Potential risk factors associated with paternal *prenatal* mental health problems included adverse childhood experiences and childbirth fear. A number of potential risk factors emerged from the literature assessing paternal *postnatal* mental health problems, including: low relationship quality; employment and income concerns; and, past and current mental health problems.

Discussion: As noted by other authors, more prospective longitudinal studies are needed to better identify risk and protective factors associated with paternal prenatal and postnatal mental health. Additionally, previous authors have noted that a shared understanding of how to evaluate risk factors is needed to advance research such as this. Methodologically, strategies are also needed to reduce attrition among study participants in longitudinal studies and in randomized controlled trials, especially among men with mental health problems, a problem noted in several of the studies reviewed here. Future studies would also benefit from larger, randomly selected, and more representative sample populations.

There may nevertheless be policy and practice implications, based on the literature to date. For example, interventions such as asking about relationship quality in maternal mental health screening could help to identify male partners who may be experiencing mental health challenges. Based on the quality of the data, it is premature to recommend more extensive policy and practice interventions until more research is conducted.

Conclusions: The policy, practice and research communities, as well as Canadians in general, need to better understand and address paternal mental health – an underappreciated public health problem which can greatly affect child and family wellbeing.

Keywords: fathers; mental health

Acknowledgments

Firstly, I would like to thank Dr. Charlotte Waddell, my senior supervisor, for her continued encouragement, guidance, and inspiration throughout this project. Her kind words and thoughtful advice have helped me to persevere through numerous challenges, and I am immeasurably grateful for this.

Secondly, I would like to thank Dr. Denise Zabkiewicz, my second reader, for her thoughtful insight and guidance. I am very appreciative.

Thirdly, I would like to thank Simon Fraser University's Faculty of Health Sciences' faculty and staff for their encouragement and support throughout this process. I would also like to thank Simon Fraser University's health sciences librarian, Hazel Plante, for helping me to better understand how to effectively and efficiently navigate bibliographic databases.

Finally, I would like to thank my partner, family, friends, peers, and colleagues for their continued support, eagle eyes, and sparkling wit throughout this journey.

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1. Introduction

The prenatal and postnatal periods can be stressful for some expectant and new fathers due a variety of factors associated with fatherhood, including new expectations, roles, and responsibilities. Current research indicates that expectant and new fathers with mental health problems can be less attentive and nurturing toward their children and their partner. These behaviours can negatively affect child development, spousal relations, and family functioning (Barker et al., 2017; Ramchandani et al., 2009; Sweeney et al., 2016). Additionally, paternal postnatal depressive symptoms are associated with significantly higher community care costs (Edoka et al., 2011).

The two most recent and robust reviews on this topic include a narrative review by Goodman (2004) and a systematic review by Wee et al. (2011). (Schumacher et al. [2008] also conducted a literature review on birth-related paternal depression; however, this review provided a high-level overview of the topic area only, and did not include a breakdown of factors significantly associated with paternal mental health problems during either the prenatal or postnatal periods.) Goodman's 2004 narrative review assessed the relationship between paternal and maternal depressive symptoms during the first year postpartum. This review sought English academic journal articles published between 1980 and 2002 using the bibliographic databases CINAHL, MEDLINE, and PsycINFO (Goodman, 2004). The author identified 20 relevant studies, and noted that three of them were conducted in Australia, three in Canada, one in Ireland, one

in Portugal, four in the United Kingdom, and seven in the United States (the author listed the study locations for 19 of the 20 studies). Goodman (2004) stated that the main factors significantly associated with paternal postpartum depressive symptoms were: "1) personal history of depression [...]; 2) depression in partner, either prenatally or during the early postpartum period [...]; and 3) the couple's relationship and functioning" (p. 30). At this point in time, few studies had investigated paternal postpartum depression and the ones that had were "heavily weighted towards Caucasian and well-educated men" (Goodman, 2004, p. 31). Overall, Goodman (2004) called for more longitudinal research and for research involving "families of various ethnic, cultural, and socioeconomic status backgrounds" (p. 32).

Relatedly, Wee et al. (2011) conducted a systematic review of factors correlated with ante- and postnatal depressive symptoms in fathers. These authors sought English-language academic journal articles published between January 1996 and August 2009 using the following bibliographic databases: Academic Search Premier, CINAHL, Health Source: Nursing/Academic Edition, MEDLINE, and PsycINFO. This review included 30 articles, and noted that four of the studies were conducted in Australia, one in Brazil, one in Canada, one in China, one in New Zealand, one in Poland, one in Portugal, one in Switzerland, one in Taiwan, six in the United Kingdom, and six in the United States (the authors listed the study locations for 24 out of the 30 studies). Wee et al. (2011) stated that "[t]he most common correlate of elevated paternal prenatal and postnatal depressive symptoms was having a partner with elevated depressive symptoms or depression" (p. 358). The authors also highlighted the following limitations among

included studies: “small sample sizes; the use of cross-sectional designs; varied measures of depression; focus on depression in the postpartum only; and in the few longitudinal gestational studies, the inclusion of only one assessment point” (Wee et al., 2011, p. 358). Overall, these authors concluded that prospective longitudinal studies with appropriate sample sizes would allow for “more rigorous and systematic investigation of direct and indirect (mediators and moderators) predicators of depressive symptoms in fathers pre-and post-birth” (p. 376).

To date, the prevalence of many paternal prenatal and postnatal mental health problems remains unknown; however, a recent meta-analysis of 43 studies found that approximately 10% of men experience prenatal and postpartum depressive symptoms (Paulson et al., 2010). Paulson et al. (2010) also noted that the prevalence of paternal postpartum depressive symptoms was “relatively higher in the 3- to 6- month postpartum period” (p. 1961). In 2011, there were approximately 8.6 million fathers in Canada, including adoptive fathers, biological fathers, and stepfathers (Statistics Canada, 2017). Assuming that this estimated prevalence is relatively accurate, approximately 860,000 of these fathers may experience prenatal and/or postnatal depressive symptoms. This estimate suggests that paternal prenatal and postnatal mental health problems may require further attention and investigation in Canada, and may pose a significant public health problem.

Additionally, Leach et al. (2016) recently conducted a systematic review of the prevalence of paternal perinatal anxiety disorders. This review included 43 studies and determined that

"[p]revalence rates for 'any' anxiety disorder (as defined by either diagnostic clinical interviews or exceeding cut-points on symptom scales) ranged between 4.1% and 16.0% during the prenatal period and 2.4 to 18.0% during the postnatal period" (p. 675). If these rates are applied to the estimated number of fathers in Canada in 2011, this would suggest that between 352,600 and 1,376,000 of these fathers may experience prenatal anxiety symptoms, and that between 206,400 and 1,548,000 fathers experience postnatal anxiety symptoms. Again, these estimates point to the possibility that paternal prenatal and postnatal mental health problems may require further attention and investigation in Canada, and may pose a significant public health problem.

Overall, paternal mental health has been researched far less extensively than maternal mental health such that risk factors, correlates, and protective factors all require further exploration and study (Fitzgerald et al., 2015; Goodman, 2004; Wee et al., 2011). This critical literature review contributes to these efforts by identifying risk factors associated with paternal prenatal and postnatal mental health problems with the aim of helping to reduce these problems and their negative impact on families. Specifically, this critical literature review seeks to answer the following question: what risk factors are associated with mental health problems in expectant and new fathers during the prenatal and postnatal periods?

2. Definitions

This review employs Kraemer et al.'s (1997) definitions of *risk*, *risk factor*, and *correlate*. A *risk* is "the probability of an outcome within a population of subjects" (Kraemer et el., 1997, p. 337). A *risk factor* is "a measurable characterization of each subject in a specified population that precedes the outcome of interest and which can be used to divide the population into two groups (the high-risk and the low-risk groups that comprise the total population)" (Kraemer et al., 1997, p. 338). A *correlate* is a "characterization that satisfies all other requirements for a risk factor but precedence" (Kraemer et al., 1997, p. 340). Conversely, a *protective factor* is indicative of characteristics that convey benefit or the likelihood of good outcomes.

Mental health refers to an individual's "emotional, psychological, and social well-being" (United States Department of Health and Human Services, 2017). Furthermore, *mental health* is "a state of well-being in which an individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to his or her community" (World Health Organization, 2006). Conversely, *mental health problems* refer to undiagnosed symptoms that may be suggestive of an underlying mental disorder, but that may not meet diagnostic/clinical thresholds for disorder. *Mental disorders*, in turn, are conditions causing both symptoms and impairment, defined according to established diagnostic/clinical thresholds (American Psychiatric Association, 2013).

A *father* is defined as a male parent who may or may not reside in the same household as his child. The *prenatal period* is the time from conception to birth, and the *postnatal period* is the time from a child's birth through to one year after the birth.

3. Methods

The purpose of this review is to identify risk factors associated with paternal prenatal and postnatal mental problems. As noted in the introduction, paternal mental health is critical to fathers' wellbeing, partner relations, child development, and overall family health. As this topic has been relatively understudied, a theoretical framework was not employed. Instead, this review was conducted to identify all recent potentially-relevant empirical studies. Additionally, although this study aimed to assess risk factors associated with paternal prenatal and postnatal mental health problems, due to the small amount of research in this area, cross-sectional were included to help paint a clearer picture of this particular research landscape.

This review was also conducted in a systematic fashion to increase its quality and replicability. Methods were informed by Higgins et al.'s (2011) *Cochrane Handbook for Systematic Reviews of Interventions, Version 5.1.0.*, among other resources.

3.1 Bibliographic databases

The following bibliographic databases were selected with the assistance of Simon Fraser University's (SFU's) health sciences librarian: CINAHL with Full Text, Education Source, MEDLINE with Full Text, and PsycINFO. These databases were chosen because they are widely used by the health and social sciences communities and because they contain a comprehensive selection of peer-reviewed journal articles relevant to the topic of this review. Additionally, these databases are available through SFU's library.

3.2 Search terms

Search terms were generated iteratively; academic journal articles, books, and web-based resources, including the Campbell Collaboration Library and the Cochrane Database of Systematic Reviews, were reviewed for potential search terms. A list of potential search terms was discussed with SFU's health sciences librarian and then checked for relevance in the thesaurus of each database (e.g., MeSH 2017 in MEDLINE with Full Text). A variety of search strings (i.e., combinations of words) were then queried in each database to determine which ones would yield the most comprehensive and specific sets of articles. Search strings for each database varied due to differences in indexing (e.g., MeSH 2017 recommends "father-child relations" with a dash in between "father" and "child" while PsycINFO's thesaurus recommends

"father child relations" with no dash). Table 1 lists the search strings that were queried in each database.

Table 1: List of search strings

Bibliographic database	Search strings
CINAHL with Full Text	i. father-child relations AND mental health ii. fathers AND child AND mental health iii. father-infant relations AND mental health iv. fathers AND mental health
Education Source	i. "father & child" AND mental health ii. fathers AND child AND mental health iii. fathers AND mental health
MEDLINE with Full Text	i. father-child relations AND mental health ii. fathers AND child AND mental health iii. fathers AND mental health iv. fathers psychology AND mental health
PsycINFO	i. father AND child AND mental health ii. father child relations AND mental health iii. fathers AND mental health

3.3 Search steps and limiters

The following search steps were employed to identify all relevant results. First, each search string for CINAHL with Full Text was queried without search limiters and then combined using the "Search History" and "Search with OR" functions, in that order. This step was repeated for Education Source, MEDLINE with Full Text, and PsycINFO. Next, the database selection was expanded to include all four databases using the "Choose Databases" function. Results from each of the databases were then combined without search limiters using the "Search History" and "Search with OR" functions in that order. Finally, the results were limited to English language, peer-reviewed academic journal articles published between 2012 and 2017 with the

following major subject headings: “fathers,” “mental health,” and/or “mental disorders.” Table 2 presents the rationale for these limiters.

Table 2: Search limiters

Limiters	Rationale
English language	English is the author’s first language and an official language of Canada, where the results of this review may be used. Additionally, most articles in the field were published in English.
Peer-reviewed academic journal articles	Peer review helps to ensure higher-quality academic journal articles, which lends more confidence to the findings.
Published between 2012 and 2017	Dates were selected to identify the most recent findings, building on earlier reviews by Goodman (2004) and Wee et al. (2011).
Major subject headings: “fathers,” “mental health,” and/or “mental disorders”	Based on the research question and the keywords included in many relevant academic journal articles, and after comparing the retrieved results using a variety of other major subject headings, these words produced the most comprehensive and specific selection of articles.

Searches were conducted on May 17, 2017, and again on July 17, 2017, to ensure that all relevant articles were identified. On July 17, 2017, this search strategy yielded 545 results. Reference lists were manually searched for additional articles, and 7 articles total were found in the following reference lists: Barker et al. (2017), Darwin et al., (2017), Singley et al. (2015), St-Arneault et al. (2014), and Sweeney et al. (2016). This approach yielded 552 total articles overall. All searches were saved in a personal folder on EBSCO*host*, and retrieved articles were exported to Zotero, an open-source reference management software.

3.4 Inclusion and exclusion criteria

The inclusion and exclusion criteria listed in Tables 3 and 4 were applied to the titles and abstracts of the 552 articles to identify potentially-relevant studies. This screening process generated a shortlist of 52 articles. Next, inclusion and exclusion criteria were applied to the full-texts of these articles to identify studies for inclusion in the review (see the Appendix for the list of excluded articles). This process led to the inclusion of 12 studies.

Table 3: Inclusion criteria

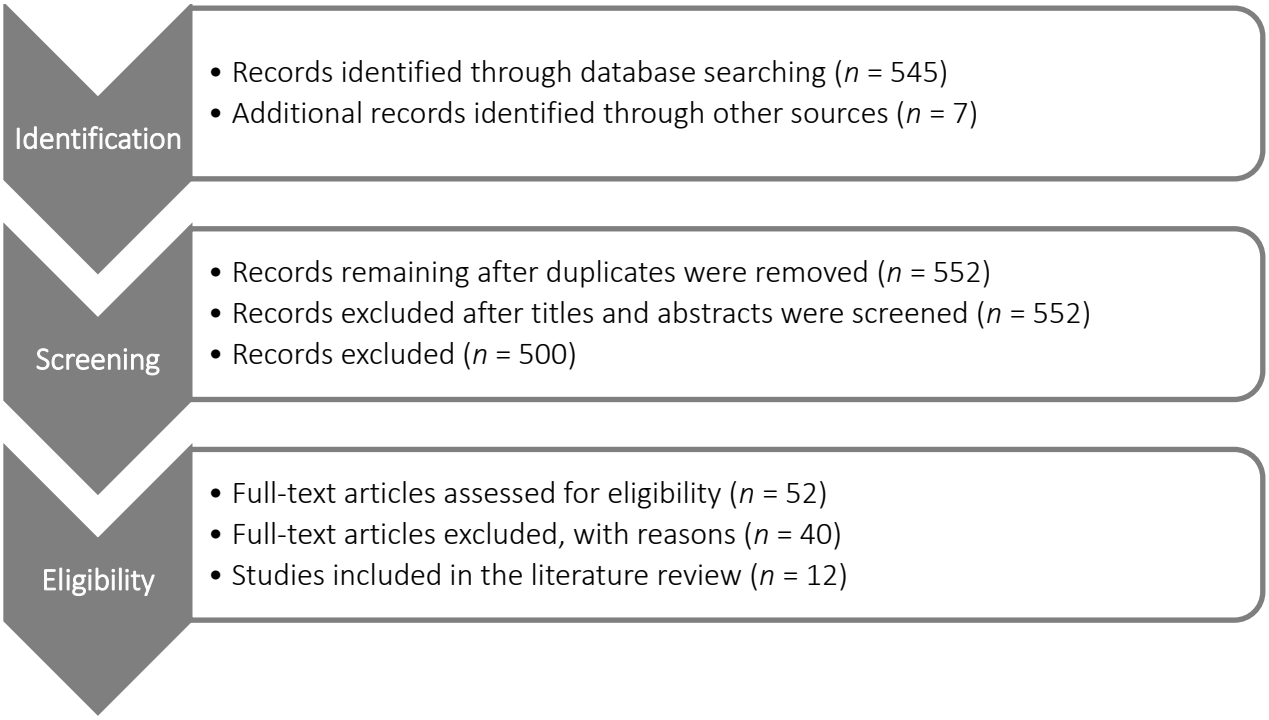
Inclusion criteria	Rationale
The study focused on risk factors associated with paternal prenatal and/or postnatal mental health problems.	This review focused on risks factors associated with paternal prenatal and postnatal mental health problems.
The study was conducted in a high-income country, based on World Bank criteria. High-income countries were identified as those with a gross national income per capita of $12,736 or more (World Bank, 2015).	This review may inform research, policy and practice in Canada and/or other high-income countries, so only studies conducted in such countries were included.
The statistical significance was reported for relevant variables.	Statistical significance conveys the degree of the association between variables.
The article describing the study was peer reviewed and published in an academic journal between 2012 and 2017.	As noted in Table 2, peer review helps to ensure higher quality academic journal articles; recent years were chosen to build on previous reviews while capturing current evidence.
The article was published in English.	As noted in Table 2, English is the author's first language is English and an official language of Canada where the results may be used; additionally, most articles in the field were published in English.
The study meets all inclusion criteria.	This helped to ensure that only the most relevant studies were included.

Table 4: Exclusion criteria

Exclusion criteria	Rationale
The study did not focus on risks for either paternal prenatal or postnatal mental health problems.	This review focused on paternal prenatal and postnatal paternal mental health problems.
The study did not report on fathers and mothers separately.	This review focused on paternal prenatal and postnatal paternal mental health problems so it was necessary for paternal information to be presented separately.
The study focused on risks associated with paternal mental health problems beyond the postnatal period.	This review focused on risks factors associated with paternal prenatal and postnatal mental health problems.
The study reported information about the prenatal or postnatal periods, but did not disaggregate the risk factors associated with these time periods.	This review focused on risks factors associated with paternal prenatal and postnatal mental health problems; to identify the risk factors associated with each time period, it was important that the included articles disaggregated this information.
The article involved a case study write-up, commentary, or a literature review.	Case studies often focus on a small sample population where data cannot be generalized to a larger population. Commentaries and literature reviews were not included because this review focused on recent articles that analyzed primary data.

In alignment with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement (Moher et al., 2009), Figure 1 details the records identified, screened, deemed eligible for inclusion, and included in this review.

Figure 1: Modified PRISMA flow diagram



4. Quality assessment criteria

The quality of the 12 included studies was assessed using the following criteria, and then scored accordingly. First, because longitudinal studies and randomized controlled trials can identify risk factors that may emerge over time, whereas cross-sectional studies can only identify correlates at one point in time, longitudinal studies and randomized controlled trials were weighted more heavily. For this reason, studies with either longitudinal or randomized controlled trial study designs were awarded 1.5 points. Second, while there is no clear-cut rule regarding sample size, studies with samples of 500 or more fathers were weighted more heavily; studies with samples of 500 or more fathers were consequently awarded 1 point. Third, because the use of either

clinic or specialized convenience samples can lead to biases in outcomes, studies with samples representative of the general population and/or selected randomly to ensure such representativeness were weighted more heavily. Studies with representative samples were awarded one point. Additionally, studies that sampled randomly were awarded 1 point. Fourth, to further ensure precision in the findings, studies were weighted more heavily if studies documented the reliability and validity of measures. Karras (1997) noted that the reliability *and* validity of a given measure must be known to accurately assess its quality. For this reason, studies were awarded a total of 0.5 points if they documented the reliability of the measures they employed, and a total of 0.5 points if they documented the validity of the measures they employed. Finally, for longitudinal studies and randomized controlled trials, high attrition rates can also lead to bias in the findings, so to minimize this source of bias, studies were weighted more heavily if attrition was less than or equal to 20%, if no intention-to-treat analyses were used. Longitudinal studies and randomized controlled trials were awarded 1 point if their attrition rate was less than or equal to 20%. This criterion did not apply to cross-sectional studies; in these cases, robust response rates (e.g., 50% or higher) were instead used to ensure that bias was minimized. Tables 5 and 6 detail the quality assessment scoring guide and the quality assessment rating guide, respectively.

Table 5: Quality assessment scoring guide

Quality assessment criteria		Points awarded
Study design	Cross-sectional	0
	Longitudinal or randomized controlled trial	1.5
Sample size	*n* < 500 study participants	0
	n > 500 study participants	1
Randomly selected sample	No	0
	Yes	1
Representative sample	No	0
	Yes	1
Response rate for cross-sectional studies	≤ 50%	0
	≥ 50%	1
Attrition rate for longitudinal studies and randomized controlled trials	≥ 20%	0
	≤ 20%	1
Documented reliability of a measure	Did not document reliability for any measures	0
	Documented reliability for all measures used	0.5
Documented validity of a measure	Did not document validity for any measures	0
	Documented validity for all measures used	0.5
Total possible points for a given study		6.5

Table 6: Quality assessment rating guide

Number of criteria met	Quality rating
5.21 – 6.50 criteria met	Very good
3.91 – 5.20 criteria met	Good
2.61 – 3.90 criteria met	Fair
1.31 – 2.60 criteria met	Poor
0.00 – 1.30 criteria met	Very poor

5. Results

Twelve studies, described in 12 articles, met the inclusion criteria for this review: one longitudinal study focused on the prenatal period (i.e., Skjothaug et al., 2015); three longitudinal studies focused on the prenatal and postnatal periods (i.e., Hildingsson et al., 2014; Leach et al., 2014; and, Leach et al., 2015); and, one randomized controlled trial (i.e., Bergström, 2013), three longitudinal studies (i.e., Leung et al., 2017; Roubinov et al., 2014; and, Suto et al., 2016), and four cross-sectional studies (i.e., de Montigny et al., 2013; Giallo et al., 2013; Luoma et al., 2013; and, Nishimura et al., 2015) focused on the postnatal period. For reporting purposes, results from the three longitudinal studies that assessed both periods were included in the analyses of the prenatal *and* postnatal periods. The sections below therefore indicate that four longitudinal studies assessed the prenatal period, while four cross-sectional studies, six longitudinal studies, and one randomized controlled trial investigated the postnatal period, even though 12 studies in total were included.

These included studies assessed a range of mental health problems, including anxiety and depressive symptoms (together), childbirth fear, depressive symptoms (only), and psychological distress. These studies used self-report measures to identify these mental health problems, and none of them reported hiring a trained clinician to confirm potential mental health diagnoses in their respective sample populations. For this reason, this review uses the term “symptoms” (e.g., depressive symptoms) to reflect the fact that these studies investigated mental health problems rather than diagnosed mental disorders.

Notably, the risk factors and correlates discussed below are not causes of paternal prenatal and/or postnatal mental health problems. Bradford Hill's nine criteria of causal inference (i.e., strength, consistency, specificity, temporality, biological gradient, plausibility, coherence, experiment, and analogy) provide a useful framework for investigating the potential cause(s) of health problems (Lucas et al., 2005, p. 792). Bradford Hill posited that most, if not all, of these criteria should be considered before stating that an exposure can cause a health outcome (Lucas et al., 2005). Although none of the included studies directly discussed all criteria, the following criteria were discussed by some of the studies: strength, consistency, and temporality. All of the studies assessed the strength of the association between certain exposures and the outcomes of interest (i.e., paternal prenatal and/or postnatal mental health problems). In addition, all of the study authors discussed the consistency of their results in comparison to previous findings to some extent. Moreover, all of the studies discussed temporality to some degree; however, only eight of the twelve studies (i.e., Bergström, 2013; Hildingsson et al., 2014; Leach et al., 2014; and, Leach et al., 2015; Leung et al., 2017; Roubinov et al., 2014; Skjothaug et al., 2015; and, Suto et al., 2016) employed a study design capable of assessing temporality. And of these eight studies, only three of them (i.e., Hildingsson et al., 2014; Leach et al., 2014; and, Leach et al., 2015) assessed the prenatal *and* postnatal period for their respective sample cohorts. Overall, none of the included studies noted a causal relationship between an exposure and the outcomes of interest. Instead, the authors stated the need for further investigation into this important public health issue.

5.1 The prenatal period

Four longitudinal studies (i.e., Skjothaug et al., 2015; Hildingsson et al., 2014; Leach et al., 2014; and, Leach et al., 2015) assessed factors related to the following paternal prenatal mental health problems: anxiety and depressive symptoms (together), childbirth fear, and psychological distress. Tables 7 and 8 detail the studies' main findings, and Tables 10 and 11 assess the studies' quality. For each study reported below, statistically significant findings are described.

5.1.1 Anxiety and depressive symptoms (together)

Skjothaug et al. (2015) assessed the relationship between adverse childhood experiences and pregnancy-related anxiety and depressive symptoms in expectant fathers in Norway. Adverse childhood experiences were defined as "verbal abuse, physical abuse, contact sexual abuse, a battered mother, household substance abuse, household mental illness, incarcerated household members, and parental separation or divorce during the respondent's first 18 years of life" (Skjothaug et al., 2014, p. 106). The authors employed a longitudinal study design and analyzed data from a representative sample population of 493 first-time fathers and 388 experienced fathers (i.e., fathers with two or more children) for a total of 881 fathers. (First-time parenting may be an important distinction regarding risk and protective factors in general.) The attrition rate for this study was 10% (Skjothaug et al., 2015).

Data were gathered at five time points during the prenatal period: weeks 8-34, weeks 20-25, weeks 26-31, weeks 32-34, and week 36 (Skjothaug et al., 2015). Adverse childhood experiences and sociodemographic information were measured at weeks 8-34 using the Adverse Childhood Experiences Scale and a questionnaire with sociodemographic questions, respectively. Pregnancy-related anxiety and depressive symptoms were measured at weeks 20-25, weeks 26-31, weeks 32-34, and week 36 using the Pregnancy-Related Anxiety Questionnaire-Revised and the Edinburgh Postnatal Depression Scale (EPDS), respectively. The authors documented the reliability and validity for the EPDS. The reference cited for the Adverse Childhood Experiences Scale (i.e., Anda et al., 2010) did not indicate whether this scale was reliable and/or valid. Similarly, the reference cited for the Pregnancy-Related Anxiety Questionnaire-Revised (i.e., Huizink et al., 2004) did not state whether this scale was reliable and/or valid.

Skjothaug et al. (2015) found that adverse childhood experiences were associated with pregnancy-related anxiety symptoms at all time points except for week 36, and with pregnancy-related depressive symptoms at all time points. It is important to note that information related to adverse childhood experiences was collected retrospectively, and that recall bias may have either underestimated or overestimated the relationship between these variables (Skjothaug et al., 2015). Given that these events preceded the prenatal period, adverse childhood experiences may be a risk factor for prenatal paternal anxiety and depressive symptoms.

Leach et al. (2015) assessed the relationship between expectant and new fatherhood status and anxiety and depressive symptoms in a randomly selected and representative sample of 1162 men in Australia. They drew upon data from a longitudinal study where men of varying fatherhood statuses (i.e., expectant father, new father, ongoing fatherhood, never fathered) were interviewed, and anxiety and depressive symptoms were measured every four years (Leach et al., 2015). During this time, 88 men were expectant fathers and 108 were new fathers. (Leach et al., 2015). The attrition rate for this study was 53% (Leach et al., 2015).

Study participants' alcohol use was measured using the Alcohol Use Disorders Identification Test, their anxiety and depressive symptoms were measured using the Goldberg Depression and Anxiety Scales, and their general mental health was measured using the 12-item Short Form Health Survey (SF-12) (Leach et al., 2015). The authors documented the reliability and validity of all measures. This study found that being either an expectant or a new father was not associated with an increase in either anxiety or depressive symptoms.

5.1.2 Childbirth fear

Hildingsson et al. (2014) investigated the relationship between "self-rated health and perceived difficulties during pregnancy as well as antenatal attendance, birth experience and parental stress in fathers with and without childbirth fear" (p. 248) in a longitudinal study that recruited a clinic sample of 1047 expectant fathers from three hospitals in Sweden. The authors did not

indicate the number of first-time fathers in their final sample population. The attrition rate for this study was 41% (Hildingsson et al., 2014).

Data were gathered at three time points: mid-pregnancy, two months postpartum, and one year postpartum (Hildingsson et al., 2014). Data related to childbirth fear was gathered mid-pregnancy using the Fear of Birth Scale, and demographic and background information as well as self-rated mental and physical health information were gathered using a questionnaire. Additionally, data on "attendance at antenatal visits and parent education classes" (Hildingsson et al., 2014, p. 250) were gathered at two months postpartum, and data on parental stress were gathered at one year postpartum using the Swedish Parental Stress Questionnaire. The authors documented the reliability and validity of the Fear of Birth Scale and the Swedish Parental Questionnaire.

The study found that expectant fathers with childbirth fear were more likely to perceive both their mental and physical health as either moderate or poor in comparison to expectant fathers without this fear; these findings were more pronounced in first-time fathers (Hildingsson et al., 2014). Childbirth fear in expectant fathers was also associated with an increase in a father's perception of pregnancy difficulties and with an increase in perceived difficulties during labour and birth (Hildingsson et al., 2014); this finding was also more pronounced in first-time fathers. Notably, first-time fathers with childbirth fear were "less likely to attend antenatal education classes," and all fathers with childbirth fear in mid-pregnancy were more likely to "score higher

on four out of five subscales as well as on the total [Swedish Parental Stress Questionnaire]" one year after birth compared to fathers without childbirth fear (Hildingsson et al., 2014, p. 250). Given that childbirth fear precedes the postnatal period, this finding highlights the possibility that childbirth fear may be a risk factor for postnatal paternal mental health problems.

5.1.3 Psychological distress

Leach et al. (2014) investigated the relationship between expectant and new fatherhood status and psychological distress using data from 10 waves of a nationally-representative longitudinal household survey in Australia. The study's sample involved 4435 men between the ages of 15 and 50 years. During the 10 waves of this survey, "349 became new fathers (i.e., had one child aged < one year) at some point in time, and of these men, 224 were identified as expectant fathers (i.e., their partners were pregnant") (Leach et al., 2014, p. 583). The attrition rate of this study was 36% (University of Melbourne, 2013).

Psychological distress was measured with the Mental Health Inventory 5, which "assessed symptoms of depression and anxiety, as well as positive aspects of mental health in the past four weeks" (Leach et al., 2014, pp. 583-584). Authors measured physical health with the Short Form General Health Survey (SF-36) (Leach et al., 2014). The authors documented the validity of the Mental Health Inventory 5; however, it was not possible to access the reference that Leach et al. (2014) cited with regard to the Mental Health Inventory 5 (i.e., Ware et al., 2004), so its

reliability is unknown. Additionally, it was not possible to access the article that Leach et al. (2014) cited with reference to the SF-36 (i.e., Ware et al., 2004), so its reliability and validity are unknown. This study found that expectant and new fatherhood status was associated with improved mental health (Leach et al., 2014). This finding highlights the possibility that expectant fatherhood status may be a protective factor for some men.

5.2 The postnatal period

One randomized controlled trial (i.e., Bergström, 2013), six longitudinal studies (i.e., Hildingsson et al., 2014; Leach et al., 2014; and, Leach et al., 2015; Leung et al., 2017; Roubinov et al., 2014; and, Suto et al., 2016), and four cross-sectional studies (i.e., de Montigny et al., 2013; Giallo et al., 2013; Luoma et al., 2013; and, Nishimura et al., 2015) assessed factors related to the following paternal postnatal mental health problems: anxiety and depressive symptoms (together), childbirth fear, depressive symptoms (only), and psychological distress. Tables 8 and 9 detail the main findings from these studies, and Tables 11 and 12 discuss their quality. For each study reported below, statistically significant findings are described.

5.2.1 Anxiety and depressive symptoms (together)

Luoma et al. (2013) assessed the relationship between paternal, maternal, infant and family factors and paternal postnatal anxiety and depressive symptoms. The authors employed a cross-

sectional study design and recruited a non-representative, clinic sample of 194 father-mother-infant triads from 10 well-baby clinics in Finland. This sample included both first-time and experienced fathers, although the authors did not indicate the proportion of each group. The response rate was 53% (Luoma et al., 2013).

Fathers and mothers completed the EPDS and "general information questionnaires during routine check-ups of the infants" (Luoma et al., 2013, p. 407). The authors documented the reliability and validity of the EPDS. This study found that the following variables were associated with anxiety and depressive symptoms: having more than two children in the family; low relationship quality (paternal report); low relationship quality (maternal report); maternal anxiety and depressive symptoms; maternal work related problems; paternal work related problems; paternal unemployment; perceived mental health as either moderate or poor (paternal report); perceived health as either moderate or poor (paternal report); and, smoking (paternal report) (Luoma et al., 2013). These correlates hint at the higher burden of mental health problems that fathers and mothers with low socioeconomic status may experience.

As discussed in section 5.1.1 above, Leach et al. (2015) assessed the relationship between expectant and new fatherhood status and anxiety and depressive symptoms in a randomly selected and representative sample of 1162 men from Australia. This study found that neither expectant nor new fatherhood status was associated with an increase in either anxiety or

depressive symptoms. In other words, according to this study, new fatherhood status was neither a protective nor a risk factor for men during the prenatal period.

5.2.2 Childbirth fear

As discussed in section 5.1.2, Hildingsson et al. (2014) investigated the relationship between "self-rated health and perceived difficulties during pregnancy as well as antenatal attendance, birth experience and parental stress in fathers with and without childbirth fear" (p. 248) in a longitudinal study that recruited a clinic sample of 1047 expectant Swedish fathers. The study found that all fathers with childbirth fear in mid-pregnancy were more likely to "score higher on four out of five subscales as well as on the total [Swedish Parental Stress Questionnaire]" one year after birth compared to fathers without childbirth fear (Hildingsson et al., 2014, p. 250). Given that childbirth fear precedes the postnatal period, this finding highlights the possibility that childbirth fear may be a risk factor for postnatal paternal mental health problems.

5.2.3 Depressive symptoms (only)

One randomized controlled trial (i.e., Bergström, 2013), three longitudinal studies (i.e., Leung et al., 2017; Roubinov et al., 2014; and, Suto et al., 2016), and two cross-sectional studies (i.e., de Montigny et al., 2013; Nishimura et al., 2015) assessed paternal postnatal depressive symptoms (only).

Bergström (2013) investigated the relationship between "depressive symptoms and associations with paternal age, sociodemographic characteristics, and antenatal psychological well-being in Swedish first-time fathers" (p. 32). The author used data from a randomized controlled trial with 812 first-time fathers and the attrition rate was 24% (Bergström, 2013). Fathers completed a sociodemographic questionnaire in mid-pregnancy, which included questions from the Barnett Scale and the Cambridge Worry Scale, in order to assess "satisfaction with the partner relationship and worry about economy and employment" (Bergström, 2013, p. 33). They also completed the EPDS three months postpartum. The author documented the reliability of the Cambridge Worry Scale, the reliability and the validity of the Barnett Scale, and the reliability and validity of the EPDS.

Bergström (2013) noted that the following variables were associated with paternal postnatal depressive symptoms (ordered by strength of association, from highest to lowest): worry about employment, being 28 years or younger; worry about the economy; low household income; not having a college or university degree; and, low relationship satisfaction (Bergström, 2013). In this instance, being 28 years or younger and not having a college or university degree may be risk factors because these factors preceded the postnatal period. These potential risk factors and correlates, too, hint at the burden that fathers and mothers with low socioeconomic status may experience.

Leung et al. (2017) aimed to identify predictors of depressive symptoms at three months postpartum in partnered fathers and mothers living in Alberta, Canada. The authors analyzed data from a longitudinal study that recruited a convenience sample of 846 couples. The authors did not specify how many first-time fathers were included in this study, and the attrition rate was 19% (Leung et al., 2017). Fathers completed the EPDS, social support questions from Statistics Canada's Social Support Survey, the Stressful Life Events Questionnaire, and sociodemographic questions during their partner's pregnancy and again at three months after the child's birth (Leung et al., 2017). Leung et al. (2017) documented the reliability and the validity of the EPDS, and the reliability of the Social Support Questionnaire. The reference that the authors cited for the Stressful Life Events Questionnaire (i.e., Bergman et al., 2007) did not appear to include information about either the reliability or the validity of this measure.

Leung et al. (2017) noted that the following variables were associated with paternal postnatal depressive symptoms (ordered by strength of association, from highest to lowest): high paternal depressive symptoms prenatally; low household income; smoking; and, low social support postnatally. In this instance, high prenatal paternal depressive symptoms may be a risk factor because it preceded the postnatal period. Low household income and smoking could also be risk factors, but it is unclear from the article whether these factors began before or after childbirth.

Roubinov et al. (2014) examined predictors of postnatal paternal depressive symptoms in a longitudinal study with a convenience sample population of 92 Mexican American men in the

United States; these men were recruited through their female partners who were participating in a study on maternal and child health. The authors did not specify the number of first-time fathers in the sample population. The attrition rate for fathers was 12% (Roubinov et al., 2014). Mid-pregnancy, expectant mothers provided information about the fathers' employment status and their relationship quality, while fathers completed the following measures orally (due to low literacy rates) during interviews at 15 and 21 weeks postpartum: the Dyadic Adjustment Scale, the EPDS, and the Acculturation Rating Scale for Mexican Americans II. The authors documented the reliability and validity of all measures. This study found that postnatal paternal depressive symptoms were negatively associated with (ordered by strength of association, from highest to lowest): father's employment status; a lower orientation to "Anglo" culture (i.e., lower engagement in the culture of English-speaking populations); number of biological children; and, relationship quality (Roubinov et al., 2014).

Suto et al. (2016) conducted a longitudinal study with a representative sample of 215 fathers from Japan to assess the relationship between variables measured during the prenatal period and paternal postnatal depressive symptoms. The authors did not specify how many first-time fathers were included. The attrition rate was 20% (Suto et al., 2016). Authors mailed fathers and mothers a baseline questionnaire and the EPDS during the mother's pregnancy (week 20), and subsequent questionnaires, along with the EPDS, at five time points following the child's birth: a few days, two weeks, one month, two months, and three months after childbirth (Suto et al., 2016). Suto et al. (2016) documented the reliability and validity of the EPDS. The study found

that the following risk factors were associated with postnatal paternal depressive symptoms (ordered by strength of association, from highest to lowest): prenatal paternal depressive symptoms and a history of psychiatric treatment before pregnancy (Suto et al., 2016).

de Montigny et al. (2013) assessed the relationship between psychosocial factors and paternal postnatal depressive symptoms in Quebec, Canada. The authors used a cross-sectional study design and recruited a non-representative sample of 205 first-time fathers, who made up approximately half of the sample population (50.2%), and experienced fathers from eight areas in Quebec (de Montigny et al., 2013). The response rate was 70.2% (de Montigny et al., 2013). Fathers completed the following questionnaires: the Dyadic Adjustment Scale, the EPDS, the Parent Expectations Survey questionnaire, the Parenting Stress Index, the Paternal Involvement Questionnaire, and the Social Support Scale. The authors documented the reliability and validity of the Dyadic Adjustment Scale, the reliability and validity of the EPDS, the reliability and validity of the Parents Expectations Survey, the reliability of the Parenting Stress Index, the reliability of the Paternal Involvement Questionnaire, and the reliability and validity of the Social Support Scale. The following correlates were associated with paternal postnatal depressive symptoms in this study (ordered by strength of association, from highest to lowest): parenting distress; low quality of marital relationship; and, poor perception of parenting efficacy.

Lastly, Nishimura et al. (2015) assessed the relationship between numerous sociodemographic and health-related factors and paternal postnatal depressive symptoms in Japan. The authors

employed a cross-sectional study design and recruited a non-representative sample of 807 couples with a four-month-old child (Nishimura et al., 2015). The authors did not specify the number of first-time fathers in the sample. The response rate was 40% (Nishimura et al., 2015). Couples received two sets of mailed questionnaires, which included the EPDS and the Quality of Marriage Index, and were asked to complete them individually and return them by mail (Nishimura et al., 2015). The authors documented the reliability and validity of the EPDS, and the reliability of the Quality of Marriage Index. According to this study, paternal postnatal depressive symptoms were positively associated with the partner's depressive symptoms. Additionally, the following correlates were negatively associated with paternal postnatal depressive symptoms (ordered by strength of association, from highest to lowest): experience visiting a medical institution for a mental health problem; pregnancy with infertility treatment; economic anxiety; and, relationship satisfaction. Experience visiting a medical institution for a mental health problem may be a risk factor; however, given the study's cross-sectional design and the information provided in the article, it was unclear whether this factor occurred before or after childbirth.

5.2.4 Psychological distress

As discussed in section 5.1.3 above, Leach et al. (2014) investigated the relationship between expectant and new fatherhood status and psychological distress using data from 10 waves of a nationally-representative longitudinal household survey in Australia. This study found that

expectant and new fatherhood status was associated with improved mental health (Leach et al., 2014). This finding highlights the possibility that expectant fatherhood status may be a protective factor for some men.

Giallo et al. (2013) investigated "a broad range of sociodemographic, individual, infant, and contextual factors to identify those associated with fathers' psychological distress in the first year postpartum" (p. 563). These authors analyzed the first wave of data from a nationally-representative longitudinal study in Australia. Giallo et al.'s study had a sample size of 3219 fathers, which included first-time fathers and experienced fathers. The response rate was 57.2% (Giallo et al., 2013). Fathers completed the Kessler-6, which measured mental health, along with the Job Quality Index and the Australian National University Status Scale. The authors documented the reliability and validity of the Kessler-6; however, it was not possible to find the reference cited for the Job Quality Index (i.e., Strazdins et al., 2006). Additionally, the reference cited for the Australian National University Status Scale (i.e., Jones et al., 2001) did not appear to include information about either the reliability or the validity of this scale. Paternal postnatal psychological distress was correlated with the following variables (ordered by strength of association, from highest to lowest): low job quality; low relationship quality; having a partner with a more prestigious occupation; increasing symptoms of psychological distress in mother; and, decreasing parenting self-efficacy.

Table 7: Main findings in studies assessing the prenatal period

Author(s)	Year	Location	Study aim(s), including mental health problems(s) assessed	Study design	Main findings	Includes possible risk factors
Skjothaug et al.	2015	Norway	Skjothaug et al. (2015) explored how "paternal adverse childhood experiences relate to anxious and depressive feelings during pregnancy" (p. 104).	Longitudinal	Self-reported pregnancy-related anxiety was associated with adverse childhood experiences at all times points except T5 (T2: slope (*m*) = 0.97, *p* = 0.014; T3: *m* = 0.51, *p* = 0.36; T4: *m* = 0. 72, *p* = 0.001; T5: *m* = 0.37, *p* = 0.075). Self-reported pregnancy related depressive symptoms were associated with adverse childhood experiences at all time points (T2: *m* = 0.71, *p* = 0.002; T3: *m* = 0.39, *p* = 0.004; T4: *m* = 0.51, *p* < 0.001; T5: *m* = 0.36, *p* = 0.001).	Yes

Table 8: Main findings in studies assessing the prenatal and postnatal periods

Author(s)	Year	Location	Study aim(s), including mental health problems(s) assessed	Study design	Main findings	Includes possible risk factors
Hildingsson et al.	2014	Sweden	Hildingsson et al. (2014) compared "compare self-rated health and perceived difficulties during pregnancy as well as	Longitudinal	Childbirth fear in expectant fathers was associated with: perceived difficulties of labour and birth (AOR 4.3 [CI 2.9, 6.3], *p* < 0.001), perceived mental health as moderate or poor (AOR 3.0 [CI 1.8, 5.1], *p* < 0.001), perceived difficulties of	Yes

			antenatal attendance, birth experience and parental stress in fathers with and without childbirth related fear" (p. 248).		pregnancy (AOR 2.1 [CI 1.4, 3.0], $p <$ 0.001), perceived health as moderate or poor (AOR 1.8 [CI 1.2, 2.8], $p < 0.01$) First-time fathers with childbirth fear attended fewer antenatal classes (AOR 2.3 [CI 1.2, 4.2], $p = 0.01$) compared to fathers without childbirth fear. Fathers with childbirth fear had higher levels of parental stress one year after the birth of their child (t-test -2.985, df = 618, $p = 0.003$).	
Leach et al.	2014	Australia	Leach et al. (2014) used "10 waves of Australian longitudinal, population-based date to investigate whether expectant or new (first-time) fatherhood is associated with an increase in psychological distress" (p. 583).	Longitudinal	First-time expectant fatherhood status was associated with improved mental health (within person change) (β 2.01 [CI 0.36, 3.67], $p < 0.001$). First-time new fatherhood status was also associated with improved mental health (β 2.07 [CI 0.57, 3.57], $p < 0.01$).	Yes
Leach et al.	2015	Australia	Leach et al. (2015) used "prospective longitudinal data to investigate whether becoming a first-time expectant (partner	Longitudinal	Leach et al. (2015) stated that "[l]ongitudinal mixed models showed no significant increase in depression or anxiety as a function of expectant or new fatherhood, as compared with pre-fatherhood levels" (p. 471).	None identified

			pregnant) and/or new father (child < 1 year) is associated with increases in depression and anxiety" (p. 471).			

Table 9: Main findings in studies assessing the postnatal period

Author(s)	Year	Location	Study aim(s), including mental health problems(s) assessed	Study design	Main findings	Includes possible risk factors
Bergström,	2013	Sweden	Bergström (2013) investigated "the depressive symptoms and associations with paternal age, socio-demographic characteristics and antenatal psychological well-being in Swedish first-time fathers" (p. 32).	Randomized controlled trial	83 (10.3%) fathers had a score of ≥ 11 on the EPDS, indicating elevated depressive symptoms. The following variables were associated with an increased risk in paternal depressive symptoms: worry about employment (OR 2.63 [CI 1.39, 4.98]); age ≤ 28 years (OR 2.55 [CI 1.50, 4.35]); worry about the economy (OR 2.54 [CI 1.36, 4.72]); low household income (OR 2.08 [CI 1.29, 3.38]); not having a college/university degree (OR 1.97 [CI 1.19, 3.25]); and, low satisfaction with partner relationship (OR 2.22 [CI 1.20, 4.11]).	Yes

de Montigny et al.	2013	Canada	de Montigny et al. (2013) identified "the psychosocial factors associated with paternal postnatal depression" (p. 44).	Cross-sectional	The following variables were associated with postnatal paternal depressive symptoms: parenting distress (OR 1.11 [CI 1.01, 1.22], $p = 0.03$); low quality of marital relationship (OR 0.93 (CI 0.87, 1.00), $p = 0.05$); and, poor perception of parenting efficacy (OR 0.54 [CI 0.30, 1.00], $p = 0.05$).	No, correlates only
Giallo et al.	2013	Australia	Giallo et al. (2013) explored "a broad range of socio-demographic, individual, infant and contextual factors to identify those associated with fathers' psychological distress in the first year postpartum" (p. 563).	Cross-sectional	Fathers' psychological distress was associated with: job quality with one/none out of four favourable work conditions met (AOR 5.20 [CI 2.93, 9.18], $p < 0.001$); low relationship quality (AOR 3.66 [CI 2.67, 5.02], $p < 0.001$); job quality with two out of four favourable work conditions met (AOR 2.51 [CI 1.60, 3.95], $p < 0.001$); having a partner with a more prestigious occupation (AOR 2.39 [CI 1.02, 5.59], $p = 0.044$); job quality with three out of four favourable work conditions met (AOR 1.75 [CI 1.15, 2.65], $p = 009$); increasing symptoms of psychological distress in the mother (AOR 1.07 [CI 1.03, 1.12], $p = 0.001$); and, decreasing parenting self-efficacy (adjusted odds ratio [AOR] 1.03 [CI 1.01, 1.06], $p = 0.006$).	No, correlates only

Leung et al.	2017	Canada	Leung et al. examined "the predictors of depression at 3 months postpartum, comparing depressed couples to couples with only one depressed partner or no depressed partner" (p. 420).	Longitudinal	The following variables were associated with postnatal paternal depressive symptoms: high prenatal paternal depressive symptoms (OR 9.11 [CI 5.40, 15.4], p = 0.000); low household income (OR 2.71 [CI 1.54, 4.78], p = 0.001); smoking (OR 2.42 [CI 1.17, 5.02], p = 0.018); and, postnatally low social support (OR 0.87 [CI 0.82, 0.93], p = 0.000).	Yes
Luoma et al.	2013	Finland	Luoma et al. (2013) examined "the paternal, maternal, infant and family factors associated with the occurrence of depressive and anxiety symptoms in fathers with infants" (p. 407).	Cross-sectional	Anxiety and depressive symptoms in fathers were associated with the following variables: mother perceives low relationship quality (proportion of fathers with EPDS score ≥ 6 was 66.7%, p = 0.017); father was unemployed (proportion of fathers with EPDS score ≥ 6 was 55.6%, p = 0.023); father perceives low relationship quality (proportion of fathers with EPDS score ≥ 6 was 55.6%, $p \leq 0.001$); father perceived mental health as moderate or poor (proportion of fathers with EPDS score ≥ 6 was 55%, $p < 0.001$); mother has depressive and anxiety symptoms (proportion of fathers with EPDS score ≥ 6 was 45.7%, $p < 0.001$); father perceived health as moderate or poor (proportion of fathers with EPDS score ≥ 6 was 38.7%, $p < 0.001$); father had work-related problems (proportion of fathers with EPDS score ≥ 6 was 37.9%, $p < 0.001$); smoking	No, correlates only

					(proportion of fathers with EPDS score ≥ 6 was 32.7%, $p = 0.015$); mother has worked related problems (proportion of fathers with EPDS score ≥ 6 was 30%, $p \leq 0.005$); and, there were two or more children in the family (proportion of fathers with EPDS score ≥ 6 was 28.9%, $p = 0.022$).	
Nishimura et al.	2015	Japan	Nishimura et al. (2015) examined "the prevalence and relevant factors associated with paternal postnatal depression at four months postpartum" (p. 1).	Cross-sectional	Postnatal paternal depressive symptoms were positively associated with partner's depressive symptoms (AOR 1.91 [CI 1.05-3.47]). The following variables were negatively associated with paternal depressive symptoms: an experience visiting a medical institution for a mental health problem (AOR 4.56 [CI 2.06, 10.08]); pregnancy with infertility treatment (AOR 2.36 [CI 1.32, 4.24]); economic anxiety (AOR 2.15 [CI 1.34, 3.45]); and, relationship satisfaction (AOR 0.83 [CI 0.77, 0.89]).	No, correlates only
Roubinov et al.	2014	United States	Roubinov et al. (2014) examined the prevalence and predictors of paternal postnatal depression in Mexican American fathers.	Longitudinal	Postnatal paternal depressive symptoms were negatively associated with: father's employment status (correlation coefficient -1.79, $p \leq 0.05$); a lower orientation to "Anglo" culture (i.e., lower engagement in the culture of English-speaking populations) (correlation coefficient -0.965, $p \leq 0.05$); number of biological children (correlation coefficient -0.495, $p \leq 0.05$; and, relationship quality (correlation	Yes

					coefficient: -0.120, $p < 0.10$) (Roubinov et al., 2014).	
Suto et al.	2016	Japan	Suto et al. (2016) investigated "the point and period prevalence of paternal postpartum depression and its association with factors measured during pregnancy" (p. 253).	Longitudinal	Suto et al. (2016) indicated that 36 (16.7%) of fathers in the sample had elevated depressive symptoms and scored ≥ 8 on the EPDS. The following variables were associated with paternal depressive symptoms: prenatal paternal depressive symptoms (AOR 5.70 [CI 1.89, 17.18], $p < 0.01$); and, a history of psychiatric treatment before pregnancy (AOR 5.39 [CI 1.39, 20.88], $p < 0.05$).	Yes

Table 10: Quality assessment of prenatal studies

Authors, location, year	Study design	Sample size, *n* > 500	Randomly selected sample	Representative sample	Attrition rate / response rate	Documented reliability and validity			Quality rating
						Measure	Reliable	Valid	
Skjothaug et al., Norway, 2015	Longitudinal	881	No	Yes; data from a community-based population study was used	Attrition rate: 10% (976/981)	EPDS	Yes	Yes	Good (5.00)
						Adverse Childhood Experience Scale	Cited reference (i.e., Anda et al., 2010) does not appear to include this information	Cited reference (i.e., Anda et al., 2010) does not appear to include this information	
						Pregnancy-Related Anxiety	Cited reference (i.e.,	Cited reference (i.e.,	

						Questionnaire-Revised	Huizink et al., 2004) does not appear to include this information	Huizink et al., 2004) does not appear to include this information	

Table 11: Quality assessment of prenatal and postnatal studies

Authors, location, year	Study design	Sample size, *n* > 500	Randomly selected sample	Representative sample	Attrition rate / response rate	Documented reliability and validity			Quality rating
						Measure	Reliable	Valid	
Hildingsson et al., Sweden, 2014	Longitudinal	1047	No	No; study participants were recruited from three hospitals	Attrition rate: 41% (427/1047)	Fear of Birth Scale	Yes	Yes (Haines et al., 2011)	Fair (3.50)
						Swedish Parental Stress Questionnaire	Yes (Östberg, 1998)	Yes (Östberg, 1998)	
Leach et al., Australia, 2014	Longitudinal	349	Not reported	Yes; data was gathered from a nationally representative household panel survey	Attrition rate: 36% (*n* = 4967/13,969) (University of Melbourne, 2013)	Mental Health Inventory 5	Unable to access cited reference (i.e., Ware et al., 1994)	Yes	Fair (2.75)
						Short Form General Health Survey (SF-36)	Unable to access cited reference (i.e., Ware	Unable to access cited reference (i.e., Ware	

							et al., 1994)	et al., 1994)	
Leach et al., Australia, 2015	Longitudinal	196	Yes; the sample was "randomly selected from [Australian] electoral rolls" (Leach et al., 2015, p. 472)	Yes; the sample was "randomly selected from [Australian] electoral rolls" (Leach et al., 2015, p. 472)	Attrition rate: 53% (*n* = 614/1162)	Alcohol Use Disorders Identification Test	Yes (Saunders et al., 1993)	Yes (Saunders et al., 1993)	Good (4.50)
						Goldberg Depression and Anxiety Scales	Yes (Goldberg et al., 1988)	Yes (Goldberg et al., 1988)	
						Short Form Health Survey (SF-12)	Yes	Yes	

Table 12: Quality assessment of postnatal studies

Authors, location, year	Study design	Sample size, *n* > 500	Randomly selected sample	Representative Sample	Attrition rate / response rate	Documented reliability and validity			Quality rating
						Measure	Reliable	Valid	
Bergström, Sweden, 2013	Data from a randomized controlled trial	812	No	No; recruitment took place at 15 antenatal clinics across Sweden	Attrition rate: 24%(*n* = 252/1064)	Cambridge Worry Scale	Yes	No	Fair (3.50)
						Barnett Scale	Yes	Yes	
						EPDS	Yes (Edmondson et al., 2010)	Yes (Edmondson et al., 2010)	
de Montigny et al., Canada,	Cross-sectional	205	No	No; study participants were recruited from medical	Response rate: 70.2% (*n* = 205/292)	EPDS	Yes (Edmondson et al., 2010)	Yes (Edmondson et al., 2010)	Poor (1.83)
						Dyadic	Yes	Yes	

2013				clinics, hospitals, birthing homes, community organizations, and breast feeding support groups		Adjustment Scale	(Spanier, 1976)	(Spanier, 1976)	
						Parents Expectations Survey	Yes (Reece, 1992)	Yes (Reece, 1992)	
						Parenting Stress Index	Yes	Unable to access reference cited (i.e., Abidin, 1995)	
						Paternal Involvement Questionnaire	Yes	Unable to access reference cited (i.e., Devault et al. 2012)	
						Social Support Scale	Yes (Dunst et al., 1994)	Yes (Dunst et al., 1994)	
Giallo et al., Australia, 2013	Cross-sectional	3219	Yes	Yes; data was drawn from a nationally representative longitudinal study	Response rate: 57.2% (*n* = 5107/8921) (Soloff et al., 2005, p 27)	Kessler-6 scale	Yes (Kessler et al., 2003)	Yes (Kessler et al., 2003)	Good (4.33)
						Job Quality Index	Unable to locate cited reference (i.e., Strazdins et al., 2006)	Unable to locate cited reference (i.e., Strazdins et al., 2006)	
						Australian National University	Cited reference did not	Cited reference did not	

						Status Scale	include this information (i.e., Jones et al., 2001)	include this information (i.e., Jones et al., 2001)	
Leung et al., Canada, 2017	Longitudinal	846	No	No; study participants were recruited from "high volume maternity care and ultrasound clinics" (Kaplan et al., 2014). The study was also advertised via posters, local radio and television spots, and prenatal education classes.	Attrition rate: 19% (*n* = 197/1043	EPDS	Yes	Yes	Good (4.00)
						Social Support Questionnaire	Yes	The cited reference did not include this information (i.e., Galambos et al., 2004)	
						Stressful Life Events Questionnaire	Cited reference did not include this information (i.e., Bergman et al., 2007)	Cited reference did not include this information (i.e., Bergman et al., 2007)	

Luoma et al., Finland, 2013	Cross-sectional	194	No	No; the sample was drawn from 10 well-baby clinics in Finland	Response rate: 53% (*n* = 194/363)	EPDS	Yes (Matthey et al., 2001)	Yes (Matthey et al., 2001)	Poor (2.00)
Nishimura et al., Japan, 2015	Cross-sectional	807	No	No	Response rate: 40% (*n* = 807/2032)	EPDS	Yes	Yes	Poor (1.75)
						Quality of Marriage Index	Yes	No	
Roubinov et al., United States, 2014	Longitudinal	92	No	No; fathers were recruited through their female partners	Attrition rate: 12% (*n* = 12/104)	Dyadic Adjustment Scale	Yes	Yes	Fair (3.50)
						EPDS	Yes	Yes	
						Acculturation Rating Scale for Mexican Americans II	Yes	Yes	
Suto et al., Japan, 2016	Longitudinal	215	No	No; study participants were recruited at two health centers	Attrition rate: 20% (*n* = 55/270)	EDPS	Yes	Yes	Fair (3.50)

Table 13: Studies ranked according to quality score and rating

Author(s), location, year	Period	Score	Quality rating
Skjothaug et al., Norway, 2015	Prenatal	5.00	Good
Leach et al., Australia, 2015	Prenatal and postnatal	4.50	Good
Giallo et al., Australia, 2013	Postnatal	4.33	Good
Leung et al., Canada, 2017	Postnatal	4.00	Good
Roubinov et al., United States, 2014	Postnatal	3.50	Fair
Suto et al., Japan, 2016	Postnatal	3.50	Fair
Hildingsson et al., Sweden, 2014	Prenatal and postnatal	3.50	Fair
Bergström, Sweden, 2013	Postnatal	3.50	Fair
Leach et al., Australia, 2014	Prenatal and postnatal	2.75	Fair
Luoma et al., Finland, 2013	Postnatal	2.00	Poor
de Montigny et al., Canada, 2013	Postnatal	1.83	Poor
Nishimura et al., Japan, 2015	Postnatal	1.75	Poor

5. Discussion

In aggregate, the 12 studies in this literature review were poor-to-good quality based on an assessment of study design, sample size, sample representativeness, whether the sample was randomly selected, attrition rate (for longitudinal studies and randomized controlled trials), response rate (for cross-sectional studies), and whether the authors documented reliability and validity for the measures they used. None of the studies received a "very good" quality rating. Because longitudinal studies and randomized controlled trials are well suited to assessing risk factors, the seven longitudinal studies and one randomized controlled trial included in this review are the focus of the subsequent paragraphs.

With regard to the four longitudinal studies that assessed the prenatal period, two of them were good quality (i.e., Leach et al., 2015; and, Skjothaug et al., 2015) and two of them were fair quality (i.e., Hildingsson et al., 2014; and, Leach et al., 2014). In terms of the six longitudinal studies and the one randomized controlled trial that assessed the postnatal period, two of the longitudinal studies were good quality (i.e., Leach et al., 2015; and, Leung et al., 2017), and the remaining four longitudinal studies (i.e., Hildingsson et al., 2014; Leach et al., 2014; Roubinov et al., 2014; and, Suto et al., 2016) and one randomized controlled trial (i.e., Bergström, 2013) were fair quality. Overall, few of these studies discussed risk factors outright – although some spoke of "factors" and others of "predictors." Additionally, only three longitudinal studies disaggregated data for first-time and experienced fathers (i.e., Leach et al., 2014; Leach et al., 2015; and,

Skjothaug et al., 2015), and neither the included longitudinal studies nor the randomized controlled trial asked sample participants whether the pregnancy was planned (an important confounder). More rigorous criteria with regard to investigating risk factors, as discussed by Kraemer et al. (1997) and Kraemer et al. (2001), are therefore still needed in future studies to generate higher quality findings in this area.

5.1 Potential prenatal risk factors

Among the articles that were initially assessed for this review, only a small number of them focused on prenatal paternal mental health. This scarcity of literature, which many researchers have noted (Skjothaug et al., 2015; Hildingsson et al., 2014; Leach et al., 2014; and, Leach et al., 2015), speaks to the need for more research on paternal prenatal mental health. In this review, adverse childhood experiences and childbirth fear were nevertheless identified as risk factors (i.e., correlates that preceded the outcomes of interest) associated with prenatal paternal mental health problems (Kraemer et al., 1997).

5.1.1 Adverse childhood experiences

Adverse childhood experiences can negatively affect an individual throughout the life course. Although few expectant fathers reported having had more than one adverse childhood experience, adverse childhood experiences are “common” and are “related to many public

health problems later in life such as heart disease and cancer" (Skjothaug et al., 2015, p. 106). Skjothaug et al. (2015) posited that expectant fathers who have lived through such experiences may have higher levels of anxiety and depressive symptoms during the prenatal period because they may be more likely to reflect on painful childhood memories and to question their own parenting abilities.

5.1.2 Childbirth fear

While maternal childbirth fear has been well studied, little is known about paternal childbirth fear. Beginning in the 1970s, expectant fathers were encouraged to be more involved in the pregnancy and birth of their child as a way of "humanising medicalised birth, reducing [maternal] fear, and providing increased support for women" (Hildingsson et al., 2014, p. 249). Hildingsson et al. (2014) posited that paternal childbirth fear may stem from an expectant father's desire to protect and support their partner while simultaneously trying to "keep it together" (p. 252). For example, some expectant fathers may worry about fainting or appearing weak during labour (Hildingsson et al., 2014). Paternal childbirth fear can also stem from previous traumatic childbirth experiences. Overall, childbirth fear may be generally suggestive of poorer mental health (Hildingsson et al., 2014), and may negatively affect expectant fathers and their families.

Notably, expectant fathers with childbirth fear attended significantly fewer antenatal classes than fathers without this fear (Hildingsson et al., 2014). Their absenteeism may be due to low

self-esteem and/or a desire to mitigate the risk of receiving potentially-threatening information about their partner's pregnancy (Hildingsson et al., 2014). Additionally, fathers with childbirth fear had higher levels of parental stress one year after their child's birth (Hildingsson et al., 2014). This finding highlights the need to determine better ways to reach expectant fathers who may have childbirth fear.

Overall, adverse childhood experiences and childbirth fear appear to negatively affect how some expectant fathers approach parenthood. Expectant fathers with elevated anxiety and depressive symptoms and/or childbirth fear may be less able to care for themselves throughout the prenatal period, and these mental health problems may have long-term consequences for "their infants, their other children and partners" as well as themselves (Hildingsson et al., 2014, p. 252). These findings point to the possibility that better support for fathers with these risk factors during the pregnancy could help to reduce the negative consequences of these mental health problems for the entire family (Skjothaug et al., 2015).

5.2 Potential prenatal and postnatal protective factors

5.2.1 Fatherhood status

Leach et al. (2014) and Leach et al. (2015) conducted longitudinal studies in Australia to explore whether fatherhood status in and of itself was associated with paternal mental health problems.

Leach et al. (2014) found that both expectant father status and new father status were associated with improved mental health. Similarly, Leach et al. (2015) "found no significant increase in depression or anxiety as a function of expectant or new fatherhood, as compared with pre-fatherhood level" (p. 471). These study findings point to the idea that while the transition to fatherhood can be stressful, expectant and/or new fatherhood status may serve as a protective factor for paternal mental health — and may not be linked to an increase in paternal mental health problems in the general population.

Leach et al. (2014) further noted that it is "possible that there is considerable variation (both between and within individuals) in men's emotional responses during both their partner's pregnancy and the first year of fatherhood" (p. 475). Leach et al.'s (2014) hypothesis is echoed by an emergent theme in Åsenhed et al.'s (2013) analysis of 11 first-time paternal bloggers in Sweden: "'[b]ecoming a father for the first time is an emotional roller coaster where the role of the expectant father is not obvious'" (p. 1312). Gaining a clearer understanding of the trajectory of paternal prenatal and postnatal mental health problems could help to identify points in time when interventions would be especially helpful.

5.3 Potential postnatal risk factors

Several themes emerged from the six longitudinal studies (i.e., Hildingsson et al., 2014; Leach et al., 2014; Leach et al., 2015; Leung et al., 2017; Roubinov et al., 2014; and, Suto et al., 2016) and

one randomized controlled trial (i.e., Bergström, 2013) that investigated postnatal paternal mental health, including: low relationship quality; employment and income concerns; and, past and present mental health problems.

5.3.1 Low relationship quality

Relationship dissatisfaction is a commonly-accepted "predictor of both maternal and paternal depressive symptoms and a mediator of relationship between postnatal depression in mothers and fathers and adverse child outcomes" (Bergström, 2013, p. 36). It should be noted that this risk factor is difficult to assess because paternal postnatal depressive symptoms can both result from and cause relationship problems (Bergström, 2013). According to this critical literature review, low relationship quality was associated with: postnatal paternal depressive symptoms (Bergström, 2013; Roubinov et al., 2014). A previous narrative review (Goodman, 2004), and a recent systematic review (Wee et al., 2011) also noted that low relationship quality was a common correlate in the articles they reviewed.

Notably, a recent systematic review investigated "the effect of prenatal childbirth education for partners of pregnant women on paternal postnatal mental health and couple relationship" (Suto et al., 2017, p. 115), but did not find that prenatal education reduced the risk of either postpartum paternal depressive symptoms or relationship problems. Further intervention

research is required to better support expectant parents during the prenatal and postnatal periods (Suto et al., 2017)

5.3.2 Employment and income concerns

A number of variables related to employment and income suggested a constellation of correlates related to paternal postnatal mental health problems. Leung et al. (2017) and Bergström (2013) found an association between low household income and postnatal paternal depressive symptoms. Worry about employment and economic anxiety (Bergström, 2013) were also associated with paternal postnatal depressive symptoms. Similarly, Roubinov et al. (2014) found an association between paternal unemployment and postnatal depressive symptoms. The findings from these studies highlight the financial pressures that men may experience upon the arrival of a new family member, unemployment and economic concerns understandably may contribute to anxiety and depressive symptoms and psychological stress. These findings further underscore the fact that social determinants of health likely play a role in paternal mental health.

5.3.3 Past and current mental health problems

A history of mental health problems can predispose an individual to more mental health problems in the future, and this was reflected in four studies included in this review. Leung et al. (2017) and Suto et al. (2016) found that paternal prenatal depressive symptoms were associated

with postnatal depressive symptoms. Suto et al. (2016) also noted that a history of psychiatric treatment prior to the pregnancy was a risk factor for paternal postnatal depressive symptoms. Similarly, Goodman (2004) noted that a history of depression was one of the top three predictors of postpartum paternal depressive symptoms.

While beyond the scope of this review, one of the included cross-sectional studies (Luoma et al., 2013) noted that the way in which paternal mental health problems are evaluated and defined may need to be revisited in light of the fact that men tend to present with mental health problems differently than women do. (A similar point could be made regarding the ways in which maternal mental health problems are evaluated and defined in light of gender expectations, and mothers' social and/or economic insecurities, among other factors.)

5.3.4 Less common factors

A good quality longitudinal study reviewed here found that low postnatal social support was associated with paternal postnatal depressive symptoms (Leung et al., 2017). Another good quality longitudinal study found that lower orientation to "Anglo" culture for Mexican-American fathers was associated with paternal postnatal depressive symptoms (Roubinov et al., 2014). Roubinov et al. (2014) also found that having fewer biological children overall was associated with depressive symptoms. This finding suggests that having previous parenting experience may decrease the stress that some new fathers experience with the birth of a child. Additionally, a

fair quality randomized controlled trial found that a paternal age of 28 years or younger, not having a college or university degree, and smoking were all associated with paternal postnatal depressive symptoms (Bergström, 2013).

Overall, a number of these risk factors were reflective of certain social determinants of health including: income and social status; social support networks; employment and working conditions; and culture (Public Health Agency of Canada [PHAC], 2011). Correlates such as low income, unemployment, poor working conditions may affect a father's ability to contribute financially, which may in turn affect the type of food and housing a family can afford (PHAC, 2011). Low social support may reduce a father's ability to handle some of the challenges associated with the prenatal and postnatal periods, such as worry about their partner's pregnancy and increased tiredness, respectively (PHAC, 2011). Additionally, some cultures may experience additional health risks due partly to "dominant cultural values that contribute to the perpetuation of conditions such as marginalization, stigmatization, loss or devaluation of language and culture and lack of access to culturally appropriate health care and services" (PHAC, 2011). For example, this appears to have been the case in the instance of Mexican-American fathers who were less able to adopt the culture of English-speaking populations (Roubinov et al., 2014).

6. Limitations

This review included several limitations. First, only a small number of included studies investigated the prenatal period. This meant that it was not possible to adequately assess a comprehensive range of risk factors related to paternal prenatal mental health problems. This was especially true for risk factors that may have started in the prenatal period and continued into the postnatal period, which would have allowed for a determination of precedence (Kraemer et al., 1997; Kraemer et al., 2001).

Second, this review was limited by the quality of the included studies. Four of the twelve included studies employed cross-sectional study designs (i.e., de Montigny et al., 2013; Giallo et al., 2013; Luoma et al., 2013; and, Nishimura et al., 2015), and this study design cannot identify risk factors that emerge over time. Only three of the seven longitudinal studies (i.e., Hildingsson et al., 2014; Leung et al., 2017; and, Skjothaug et al., 2015) and two of the four cross-sectional studies (Giallo et al., 2013; and, Nishimura et al., 2015) included a sample of more than 500 men. Only one of the seven longitudinal studies (i.e., Leach et al., 2015) and one of the four cross-sectional studies (i.e., Giallo et al., 2013) had a randomly selected sample. Only three of the seven longitudinal studies (i.e., Leach et al., 2014; Leach et al., 2015; and, Skjothaug et al., 2015), and one of the four cross-sectional studies (i.e., Giallo et al., 2013) had a representative sample; with the exception of the study participants in these three studies and in Roubinov et al.'s (2014)

study, most study participants were employed, relatively well educated, middle-to-high income earners with few, if any, mental health problems.

Moreover, in terms of attrition rates, only four of the seven longitudinal studies had attrition rates less than or equal to 20% (i.e., Leung et al., 2017; Roubinov et al., 2014; Skjothaug et al., 2015; and, Suto et al., 2016). The randomized controlled trial came close with an attrition rate of 24% (i.e., Bergström, 2013). Notably, Hildingsson et al. (2014) stated that attrition rates were higher among men 25 years and younger and men with less education. Additionally, Leung et al. (2017) and Suto et al. (2016) posited that men with mental health problems may have been more likely to drop-out of their studies. Relatedly, in terms of response rates, three of the four cross-sectional studies had response rates greater than or equal to 50% (i.e., de Montigny et al., 2013; Giallo et al., 2013; and, Luoma et al., 2013).

Third, only three of the seven longitudinal studies (i.e., Skjothaug et al., 2015; Leach et al., 2014; and, Leach et al., 2015) and one of the four cross-sectional studies (i.e., de Montigny et al., 2013) disaggregated data for first-time fathers and experienced fathers. This is problematic because certain risk factors, correlates, and/or protective factors may be more pronounced in certain paternal sub-populations. For example, Hildingsson et al. (2014) noted that expectant fathers with childbirth fear were more likely to perceive both their mental and physical health as moderate or poor in comparison to expectant fathers without this fear, and that these results were especially marked in first-time fathers.

Fourth, only one of the included studies (i.e., Nishimura et al., 2015) asked study participants whether their pregnancy was planned. This is problematic because the prevalence of prenatal and postnatal mental health problems may be higher among expectant and new fathers with unplanned pregnancies. To the author's knowledge, no studies have investigated this issue among expectant and new fathers; however, a recent systematic review and meta-analysis by Abajobir et al. (2016) found that the prevalence of maternal perinatal depressive symptoms in unintended pregnancies was 21%, or double that of planned pregnancies. Unplanned pregnancy is an important confounder that needs to be addressed in future studies.

Finally, beyond the weaknesses in the extant literature, an important limitation for this review was the fact that a second assessor did not verify the searchers, the selection of studies, the data extraction process, or the interpretation of findings. With that said, team assessment was not possible given the scope of and resources available for this capstone project.

7. Conclusion

Overall, the quality of the included studies ranged from poor to good: the quality of the seven longitudinal studies ranged from fair to good, the quality of the one randomized controlled trial was fair, and the quality of the four cross-sectional studies was largely poor. Of the four longitudinal studies that assessed the prenatal period, adverse childhood experiences and childbirth fear were found to be possible risk factors significantly associated with paternal

prenatal anxiety and depressive symptoms (Skjothaug et al., 2015; Hildingsson et al., 2014). Among the seven longitudinal studies and the one randomized controlled trial that assessed the postnatal period, a number of potential risk factors emerged from the literature, including: low relationship quality; employment and income concerns; and, past and current mental health problems, among other factors. These findings highlight the critical importance of publicly-accessible child, youth, and family health services in Canada's provinces and territories to help effectively address verbal abuse, physical abuse, sexual abuse, domestic violence, substance abuse, and mental health problems and disorders – prior to people preparing to parent (Skjothaug et al., 2015).

These findings also highlight the importance of policy interventions that could help to address certain social determinants of health including income and social status, social support networks, employment and working conditions, and culture (PHAC, 2011). Given the impact of paternal mental health on child, partner, and family health, it may be worthwhile to revisit public policies focused on maternal mental health to better include components related to paternal mental health. These additions could help to acknowledge and to better address this important issue.

With regard to future studies, more prospective longitudinal studies are needed to identify risk factors and protective factors associated with paternal prenatal and postnatal mental health problems. Larger sample sizes are needed to increase the statistical power of studies. Given that younger, unemployed, less educated, and lower-income men – as well as men with mental

health problems – are more likely to experience mental health problems during the prenatal and postnatal periods, future research projects could aim to recruit more representative sample populations. Oversampling younger and less educated men in future studies may also be one way to address the high attrition rates among these higher-risk groups. It may also be worthwhile to conduct qualitative studies to determine what, if any, factors could help to improve retention rates among higher-risk men. Additionally, disaggregating data for paternal sub-populations could help to identify higher-risk groups and to consequently inform the development of targeted interventions for these groups. Finally, future studies would benefit from asking study participants whether the pregnancy was planned in order to reduce confounding.

Beyond the implications for future research, practice interventions such as including questions about relationship quality during maternal prenatal mental health screening could help to flag mental health challenges for expectant fathers. As well, practitioners could offer later appointments in order to accommodate fathers' schedules.

Yet based on the quality of the data reviewed here, it is premature to recommend more expansive policy and practice interventions until further studies are done – not only to refine the understanding of paternal risk and protective factors, but also to delineate effective intervention options. In the short and long terms, these efforts could assist the policy, practice and research

communities, as well as Canadians in general, to better understand and address paternal mental health, an understudied and underappreciated public health problem.

8. Critical reflection

My capstone project was a rewarding and very challenging experience. This project taught me the importance of continually reassessing my research question, especially as new information emerged throughout the data collection process, in order to ensure that the project's scope remained feasible. It also taught me the value of overtly stating the reasons behind my methods. While justifying each decision was difficult, it was ultimately very valuable because doing so encouraged me to continually investigate my assumptions and logic.

Overall, this project helped me to improve my understanding of population and public health. For example, I gained a stronger understanding of epidemiological concepts such as risk, risk factor, correlate, protective factors, and cause. I also came to appreciate the importance of defining these concepts clearly in studies. In addition, I gained a better understanding of the statistical methods employed in the included studies. This project also strengthened my ability to identify the benefits and drawbacks of cross-sectional designs when used to assess risk factors associated with paternal prenatal and postnatal mental health problems. Moreover, this project helped me to appreciate how certain social determinants of health (e.g., income and social status) may affect paternal prenatal and postnatal mental health.

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10. Appendix

10.1 Table: Excluded articles

Authors	Rationale(s)
Amrock, S. M., & Weitzman, M. (2014). Parental psychological distress and children's mental health: results of a national survey. *Academic Pediatrics, 14*(4), 375-381.	The study did not focus on risks for either paternal prenatal or postnatal mental health problems.
Åsenhed, L., Kilstam, J., Alehagen, S., & Baggens, C. (2014). Becoming a father is an emotional roller coaster - an analysis of first-time fathers' blogs. *Journal of Clinical Nursing, 23*(9-10), 1309-1317.	The study did not focus on risks for either paternal prenatal or postnatal mental health problems.
Charandabi, S. M-A., Mirghafourvand, M., & Sanaati, F. (2017). The effect of life style based education on the fathers' anxiety and depression during pregnancy and postpartum periods: A randomized controlled trial. *Community Mental Health Journal, 53*(4), 482-489.	The study did not focus on risks for either paternal prenatal or postnatal mental health problems.
Collings, S., Jenkin, G., Carter, K., & Signal, L. (2014). Gender differences in the mental health of single parents: New Zealand evidence from a household panel survey. Social *Psychiatry & Psychiatric Epidemiology, 49*(5), 811-821.	The study did not focus on risks for either paternal prenatal or postnatal mental health problems.
Darwin, Z., Galdas, P., Hinchliff, S., Littlewood, E., McMillan, D., McGowan, L., & Gilbody, S. (2017) Fathers' views and experiences of their own mental health during pregnancy and the first postnatal year: A qualitative interview. *BMC Pregnancy and Childbirth, 17*(45), 1-15.	The study did not focus on risks for either paternal prenatal or postnatal mental health problems.
Divney, A., Gordon, D. M., Magriples, U., & Kershaw, T. (2016). Stress and behavioural risk among young expectant couples. *Journal of Adolescence, 53*, 34-44.	Study employed an Actor-Partner Independence Model; however, it was unclear whether the "actor" referred to the expectant father or to the expectant mother. This was also true for the "partner" designation.
Don, B. P., & Mickelson, K. (2012). Paternal postpartum depression: The role of maternal postpartum depression, spousal support, and relationship satisfaction. *Couple and Family Psychology: Research and Practice, 1*(4), 323-	Study focused on how maternal postpartum depression affects paternal postpartum depression (the mechanisms), rather than risk factors for paternal mental health problems.

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Esbjørn, B. H., Pedersen, S. H., Daniel, S. I. F., Hald, H. H., Holm, J. M., & Steele, H. (2013). Anxiety levels in clinically referred children and their parents: Examining the unique influence of self-reported attachment styles and interview-based reflective functioning in mothers and fathers. *British Journal of Clinical Psychology, 52*(4), 394-407.	The study did not focus on risks for either paternal prenatal or postnatal mental health problems.
Fitzgerald, M. E., Roy, K., Anderson, E. E., & Letiecq, B. L. (2012). The effect of depressive symptoms on low-income men in responsible fathering programs. *Fathering, 10*(1), 47-65.	The study did not focus on risks for either paternal prenatal or postnatal mental health problems.
Garfield, C. F., Duncan, G., Rutsohn, J., McDade, T. W., Adam, E. K., Coley, R. L., & Chase-Lansdale, P. L. (2014). A longitudinal study of paternal mental health during transition to fatherhood as young adults. *Pediatrics, 133*(5), 836-843.	The study did not separate the results for each of the variables over the different waves, so it was not possible to determine what risks would be relevant to the prenatal and/or postnatal period.
Giallo, R., Cooklin, A., Brown, S., Christensen, D., Kingston, D., Liu, C. H., & ... Nicholson, J. M. (2015). Trajectories of fathers' psychological distress across the early parenting period: Implications for parenting. *Journal of Family Psychology, 29*(5), 766-776.	The study did not focus exclusively on the prenatal and/or the postnatal period(s). Additionally, the study did not focus on risks for either paternal prenatal or postnatal mental health problems.
Giallo, R., Cooklin, A., Wade, C., D'Esposito, F., & Nicholson, J. M. (2014). Fathers' Postnatal Mental Health and Child Well-Being at Age Five: The Mediating Role of Parenting Behavior. *Journal of Family Issues, 35*(11), 1543-1562.	The study did not focus on risks for either paternal prenatal or postnatal mental health problems.
Giallo, R., D'Esposito, F., Cooklin, A., Christensen, D., & Nicholson, J. M. (2014). Factors associated with trajectories of psychological distress for Australian fathers across the early parenting period. *Social Psychiatry and Psychiatric Epidemiology, 49*(12), 1961-1971.	This study assessed paternal psychological distress over a 7 year period postnatally" (including when children were 0-1 years old); however, it did not disaggregate the risks for paternal mental health problems for the postnatal period.
Giallo, R., Seymour, M., Matthews, J., Gavidia-Payne, S., Hudson, A., & Cameron, C. (2015).	The study did not focus on risks for either paternal prenatal or postnatal mental health

Risk factors associated with the mental health of fathers of children with an intellectual disability in Australia. *Journal of Intellectual Disability Research, 59*(3), 193-207.	problems.
Gutierrez-Galve, L., Stein, A., Hanington, L., Heron, J., & Ramchandani, P. (2015). Paternal depression in the postnatal period and child development: mediators and moderators. *Pediatrics, 135*(2), e339-e347.	The study did not focus on risks for either paternal prenatal or postnatal mental health problems.
Inglis, C., Sharman, R., & Reed, R. (2016). Paternal mental health following perceived traumatic childbirth. *Midwifery, 41*, 125-131.	The study did not focus exclusively on the prenatal and/or the postnatal period(s). Inglis et al. (2016) state, "No exclusion criteria for the time since the birth was imposed, as a father's telling of the childbirth many years later is as detailed as new fathers" (p. 127).
Kalucza, S., Hammarström, A., & Nilsson, K. (2015). Mental health and parenthood—A longitudinal study of the relationship between self-reported mental health and parenthood. *Health Sociology Review, 24*(3), 283-296.	The study did not focus on risks for either paternal prenatal or postnatal mental health problems.
Koh, Y. W., Lee, A. M., Chan, C. Y., Fong, D. Y. T., Lee, C. P., Leung, K. Y., & Tang, C. S., K. (2015). Survey on examining prevalence of paternal anxiety and its risk factors in perinatal period in Hong Kong: A longitudinal study. *BMC Public Health, 15*, 1-15.	The content of the article was perceived as unreliable because it was poorly written. For example, it reads as though the self-report data for expectant fathers and mothers were combined and reported together rather than separately.
Kotila, L. E., & Kamp Dush, C. M. (2013). Involvement with children and low-income fathers' psychological well-being. *Fathering: A Journal of Theory, Research & Practice about Men as Fathers, 11*(3), 306-326.	The study did not focus on risks for either paternal prenatal or postnatal mental health problems (the study began measuring psychological well-being at year 1 of a child's birth).
Kowlessar, O., Fox, J. R., & Wittkowski, A. (2015). First-time fathers' experiences of parenting during the first year. *Journal of Reproductive & Infant Psychology, 33*(1), 4-14.	This study did not focus on paternal mental health problems.
Kowlessar, O., Fox, J. R., & Wittkowski, A., (2015). The pregnant male: A metasynthesis of first-time fathers' experiences of pregnancy. *Journal of Reproductive & Infant Psychology, 33*(2), 106-127.	This study did not focus on paternal mental health problems.
Kvalevaag, A. L., Ramchandani, P. G., Hove, O., Assmus, J., Eberhard-Gran, M., & Biringer, E.	The study did not focus on the risks of paternal prenatal/postnatal mental health problems; it

(2013). Paternal mental health and socioemotional and behavioral development in their children. *Pediatrics, 131*(2), e463-e469.	focused on the association between fathers' psychological distress during the prenatal period and children's' socioemotional and behavioural outcomes at age 36 months.
Kvalevaag, A. L., Ramchandani, P. G., Hove, O., Eberhard-Gran, M., Assmus, J., Havik, O. E., Sivertsen, B., & Biringer, E. (2015). Parents' Prenatal Mental Health and Emotional, Behavioral and Social Development in Their Children. *Child Psychiatry and Human Development, 46*(6), 874-883.	The study did not focus on risks for either paternal prenatal or postnatal mental health problems.
Leach, L. S., Poyser, C., Cooklin, A. R., & Giallo, R. (2016). Prevalence and course of anxiety disorders (and symptoms levels) in men across the perinatal period: A systematic review. *Journal of Affective Disorders, 190*, 675-686.	The study did not focus on risks for either paternal prenatal or postnatal mental health problems.
Lee, Y., Fagan, J., & Chen, W. (2012). Do late adolescent fathers have more depressive symptoms than older fathers? *Journal of Youth And Adolescence, 41*(10), 1366-1381.	The study did not focus on risks for either paternal prenatal or postnatal mental health problems.
Lehti, V., Sourander, A., Sillanmäki, L., Helenius, H., Tamminen, T., Kumpulainen, K., & Almqvist, F. (2012). Psychosocial factors associated with becoming a young father in Finland: a nationwide longitudinal study. *BMC Public Health, 12*, 1-8.	The study did not focus on risks for either paternal prenatal or postnatal mental health problems.
Maggi, S., Ostry, A., Roberts, W., D'Angiulli, A., & Hertzman, C. (2013). Paternal Work Stress and the Mental Health of Fathers and Children: A Role for Urban and Rural Migration Patterns. *Canadian Journal of Community Mental Health, 32*(1), 59-78.	The study did not focus on risks for either paternal prenatal or postnatal mental health problems.
Pihlakoski, L., Sourander, R., Aromaa, M., Rönning, J. A., Rautava, P., Helenius, H., & Sillanpää. (2016). Do antenatal and postnatal parental psychological distress, and recognized need of help predict preadolescent's psychiatric symptoms? The Finnish Family Competence Cohort Study. *Child Psychiatry & Human Development, 44*, 305-319.	The study did not focus on risks for either paternal prenatal or postnatal mental health problems; it focused on the association between fathers' antenatal and postnatal psychological distress and children's' internalizing and externalizing behaviour problems at age 36 months.
Price-Robertson, R., Reupert, A., & Maybery, D. (2015). Fathers' experiences of mental illness	The study did not focus on risks for either paternal prenatal or postnatal mental health

stigma: Scoping review and implications for prevention. *Advances in Mental Health, 13*(2), 100-112.	problems.
Ravn, I. H., Lindemann, R., Smeby, N. A., Bunch, E. H., Sandvik, L., & Smith, L. (2012). Stress in fathers of moderately and late preterm infants: A randomized controlled trial. *Early Child Development and Care, 182*(5), 537-552.	The study did not focus on risks for either paternal prenatal or postnatal mental health problems.
Rominov, H., Pilkington, P. D., Giallo, R., & Whelan, T. A. (2016). A systematic review of interventions targeting paternal mental health in the perinatal period. *Infant Mental Health Journal, 37*(3), 289-301.	The study did not focus on risks for either paternal prenatal or postnatal mental health problems.
Rominov, H., Giallo, R., & Whelan, T. A. (2016). Fathers' postnatal distress, parenting self-efficacy, later parenting behavior, and children's emotional-behavioral functioning: A longitudinal study. *Journal of Family Psychology, 30*(8), 907-917.	The study did not focus on risks for either paternal prenatal or postnatal mental health problems; it focused on the association between fathers' psychological distress, parenting self-efficacy, and parenting behaviour on the emotional-behavioural functioning of children at 4-5 years and at 8-9 years.
Rosenthal, D. G., Learned, N., Liu, Y., & Weitzman, M. (2013). Characteristics of fathers with depressive symptoms. *Maternal and Child Health Journal, 17*(1), 119-128.	The study did not focus on risks for either paternal prenatal or postnatal mental health problems.
Sethna, V., Murray, L., Netsi, E., Psychogiou, L., & Ramchandani, P., G. (2015). Paternal depression in the postnatal period and early father-infant interactions. *Parenting: Science & Practice, 15*, 1-8.	The study did not focus on risks for either paternal prenatal or postnatal mental health problems.
Shafer, K., & Pace, G. T. (2015). Gender Differences in Depression across Parental Roles. *Social Work, 60*(2), 115-125.	The study did not focus on risks for either paternal prenatal or postnatal mental health problems.
Shetgiri, R., Lin, H., & Flores, G. (2015). Suboptimal maternal and paternal mental health are associated with child bullying perpetration. *Child Psychiatry and Human Development, 46*(3), 455-465.	The study did not focus on risks for either paternal prenatal or postnatal mental health problems.
Suto, M., Takehara, K., Yamane, Y., & Ota, E. (2017). Effects of prenatal childbirth education for partners of pregnant women on paternal postnatal mental health and couple	The study did not focus on risks for either paternal prenatal or postnatal mental health problems.

relationships: A systematic review. *Journal of Affective Disorders, 210*, 115-121.	
Sweeney, S., & MacBeth, A. (2016). The effects of paternal depression on child and adolescent outcomes: A systematic review. *Journal of Affective Disorders, 205*, 44-59.	The study did not focus on risks for either paternal prenatal or postnatal mental health problems.
Wenze, S., Battle, C., & Tezanos, K. (2015). Raising multiples: mental health of mothers and fathers in early parenthood. *Archives of Women's Mental Health, 18*(2), 163-176.	This article assessed the first postpartum year and the early parenthood period, but it did not disaggregate the results by year/period. Additionally, this article did not report the statistical significance for the relationships it discussed.
Wilkes, L., Mannix, J., & Jackson, D. (2012). 'I am going to be a dad': experiences and expectations of adolescent and young adult expectant fathers. *Journal of Clinical Nursing, 21*(1-2), 180-188.	The study did not focus on risks for either paternal prenatal or postnatal mental health problems.

10.2 Additional resources

- HeadsUpGuys: https://headsupguys.org/
- Men's Health Research at the University of British Columbia: http://menshealthresearch.ubc.ca/
- National Responsible Fatherhood Clearinghouse: https://www.fatherhood.gov/